Effects of ATP and NGF on Proliferation and Migration of Neural Precursor Cells.

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Public Summary:

Scientific Abstract:
Purinergic receptors belong to the most ancient neurotransmitter system. While their relevance in neurotransmission is well characterized, it has become clear that they have many other cellular functions. During development, they participate in regulation of proliferation and differentiation of stem cells. Here, we used rat embryonic telencephalon neurosphere cultures to detect purinergic P2 receptor subtype expression and possible synergistic actions of these receptors with NGF. Neurospheres proliferate in the presence of EGF and FGF-2; however, upon depletion of these growth factors, they migrate and differentiate into neurons and glial phenotypes. Expression patterns of P2X and P2Y receptors changed along neural differentiation. Gene expression of P2X2-7 and P2Y1,2,4,6,12,14 receptors was confirmed in undifferentiated and neural-differentiated neurospheres, with an up-regulation of P2X2 and P2X6 subtypes, together with a down-regulation of P2X4, P2X7 and P2Y subtypes upon induction to differentiation. BrdU-labeling and subsequent flow cytometry analysis was used to measure cell proliferation, which was increased by chronic exposure to NGF and increasing concentrations of ATP, in line with the expression levels of PCNA. Furthermore, a synergistic effect on proliferation was observed in conditions of co-incubation with ATP and NGF. While ATP and NGF independently promoted neural migration, no inter-relation between these factors was detected for this cellular process. As conclusion, an unknown synergism of ATP and NGF in proliferation is described. Future efforts may elucidate the underlying mechanisms of the interrelationship of ATP and NGF during neurogenesis.

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